BLUE RIVER GAME FISH POPULATION ESTIMATES

Crawford, Harrison, and Washington Counties

2006 Fish Management Report

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EXECUTIVE SUMMARY

- The Blue River originates in Washington County and flows 74 mi through Crawford and Harrison Counties. Its confluence with the Ohio River is about 3 mi east of the Town of Leavenworth.

- Fish sampling was conducted from September 11 to October 5, 2006. The sites sampled were RM 9.0, 14.7, 34.6, and 62.4. The site at RM 54.5 was not sampled due to high water conditions.

- A pulsed DC tote barge electrofisher was used to sample three stations and a pulsed DC electrofishing boat was used at RM 34.6.

- A total of 106 rock bass was sampled that weighed 11 lbs. They ranged in length from 1.2 to 7.7 in. Rock bass growth was good for all ages.

- A total of 71 smallmouth bass was sampled that weighed 11 lbs. They ranged in length from 1.8 to 12.0 in. Smallmouth bass growth was slow and similar to 2004.

- The quality of Blue River's smallmouth bass population has deteriorated since the 12-in minimum size limit was imposed in 1998.

- A black bass 12 to 15-in protective slot limit and 5 bass bag limit, of which only two can be greater than 15.0 in, will become effective in February 2007.

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INTRODUCTION

The Blue River originates in Washington County and flows 74 mi through Crawford and Harrison Counties. Its confluence with the Ohio River is about 3 mi east of the Town of Leavenworth. The Blue River watershed comprises 125,000 acres in Clark, Crawford, Floyd, Harrison, and Washington Counties. Most of the watershed in Clark, Floyd, and Washington Counties is agricultural, while Crawford and Harrison Counties are heavily forested. Harrison-Crawford State Forest, O'Bannon Woods, and Wyandotte Caves are located on the lower 20 mi of the Blue River. Forty-five miles of the Blue River was designated as a "State Scenic River" in 1975 to prevent public and private projects which would destroy the river's natural features. The river is best described as a high quality, high gradient stream which receives a substantial portion of its discharge from subterranean sources. The lower 5 mi of river are more indicative of a southwest Indiana lowland river. A black bass (smallmouth, spotted, and largemouth bass) 12-in minimum size limit was enacted in the summer of 1998 in all Indiana rivers and streams. There was no previous length limit on black bass in the Blue River.

Previous Blue River fisheries surveys were conducted in 1972, 1993, and 2000. Game fish population estimates have been conducted in 1998, 1999, 2000, 2002, and 2004. A recreational use survey was conducted in 1999.

The 2004 game fish population estimate found that the smallmouth bass population was slow growing and very few bass over 12.0 in were in the population. The rock bass population was growing well with increased numbers. A black bass 12 to 15-in protective slot limit and 5 bass bag limit, of which only two can be longer than 15.0 in, was recommended in the 2004 report. The new regulation is currently in the state's administrative rule proposal process and will go into effect in February 2007.

METHODS

Fish sampling was conducted from September 11 to October 5, 2006 at four of the five historic stations. The sites sampled were RM 9.0, 14.7, 34.6, and 62.4. The site at RM 54.5 was not sampled due to high water conditions through September and October. A pulsed DC tote barge electrofisher was used to sample three stations and a pulsed DC electrofishing boat was used at RM 34.6. River mile designations were labeled according to Hoggatt (1975). Population estimates were obtained using the depletion method and expanded with the Microfish 3.0

computer program (Van Deventer and Platts 1986). All electrofishing was conducted during the day with two dippers. The ends of each sampling station were blocked off with a block net unless a shallow riffle was present to prevent game fish passage. Smallmouth bass, spotted bass, rock bass, and largemouth bass were the target species. At least three electrofishing passes were conducted to remove as many game fish as possible.

All fish collected were measured to the nearest 0.1 in TL and weighed to the nearest 0.01 lb. Scales were taken from a subsample of game fish for age and growth analysis. Proportional stock density and RSD were calculated for rock bass and smallmouth bass (Anderson and Neumann 1996). A single factor analysis of variance statistical test was used to determine the significance of some of the results.

RESULTS

Rock bass

A total of 106 rock bass was sampled that weighed 11 lbs. They ranged in length from 1.2 to 7.7 in (Appendix 1). The PSD was 3, which significantly decreased when compared to 1993 through 2004 values ($F = 12.35$, df = 6, $P = 0.02$). The RSD8 was 0, which also significantly decreased ($F = 11.51$, df = 6, $P = 0.02$). The PSD in 2004 was 18 and the RSD8 was 9. Previous PSDs (1993 to 2002) ranged from 29 to 39 and RSD8s ranged from 8 to 16 (Figure 1). Rock bass growth was good and improved by approximately 1.0 in for ages 1, 2, and 4 (Table 1).

Rock bass population estimates ranged from 192 (RM 9.0) to 860/mi (RM 14.7). The average was 383/mi which was a 45% decrease from 2004 (Appendix 2). Previous average population estimates ranged from 113 (2000) to 698/mi (2004) (Figure 2).

Smallmouth bass

A total of 71 smallmouth bass was sampled that weighed 11 lbs. They ranged in length from 1.8 to 12.0 in. The smallmouth bass PSD was 4, which significantly decreased when compared to 1993 through 2004 values ($F = 9.65$, df = 6, $P = 0.03$) (Figure 3). The RSD12 was 4, which did not significantly change from previous surveys. The PSD in 2004 was 8 and the RSD12 was 3. Smallmouth bass growth was similar to 2004 averages, and slower than 2000 and 2002 for ages 2 and 3 (Table 2).

Smallmouth bass population estimates (excluding age 0) ranged from 62 (RM 9.0) to 380/mi (RM 14.7) and averaged 210/mi. Previous average population estimates ranged from 91 (1999) to 299/mi (2002) (Figure 4). The population estimates have significantly increased in the last three surveys when compared to 1998 through 2000 estimates ($F = 35.88$, df = 5, $P = 0.04$) (Appendix 2).

Spotted bass

A total of 22 spotted bass was collected that weighed 3 lbs. They ranged in length from 2.8 to 8.3 in. An age-1 spotted bass averaged 4.4 in, an age-2 bass averaged 6.9 in, and an age-3 bass averaged 8.0 in. Spotted bass population estimates ranged from 0 (RM 62.4) to 100/mi (RM 14.7 and 34.6) and averaged 41/mi.

DISCUSSION

The current findings support the recommended black bass 12 to 15-in slot limit and 5 bass bag limit proposed in 2004. Few bass over 12.0 in are in the population and growth is slow. The 12 to 15-in slot limit will improve size structure by protecting larger bass and allowing the harvest of small bass.

The rock bass population has decreased in number since 2004 estimates. Few rock bass over 7.0 in and no fish older than age 4 were collected. This was the first population estimate where the numbers of older rock bass were depressed. The population indices are low indicating many small fish in the population and few large fish. The population indices are well below 2004 values, but should rebound if the current good growth is maintained. The rock bass population's size structure will be monitored in the 2008 population estimate.

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Table 1. Rock bass mean length at age, 1998 to 2006.

Year	Age							
	1	2	3	4	5	6	7	8
1998	2.4	3.5	4.5	6.0	6.9	7.6	7.9	9.1
1999	2.1	3.8	4.6	6.3	7.2	8.8	8.7	9.3
2000	3.5	4.4	5.6	6.4	7.6	8.3		9.3
2002	2.5	4.5	5.7	7.3	8.4	9.2	9.8	
2004	2.5	4.2	6.0	7.0	8.1	8.8	9.1	
2006	3.6	5.2	6.3	7.8				

Table 2. Smallmouth bass mean length at age, 1998 to 2006.

Year	Age						
	1	2	3	4	5	6	7
1998	4.3	6.7	9.4	10.3	14.1	14.8	17.8
1999	3.7	6.4	8.7	10.6	13.0	14.3	
2000	5.5	8.2	10.1	11.8	12.8		15.0
2002	5.0	7.8	10.2	12.2	13.8	14.8	15.8
2004	4.9	6.8	9.3	11.1			
2006	5.5	6.8	8.9				

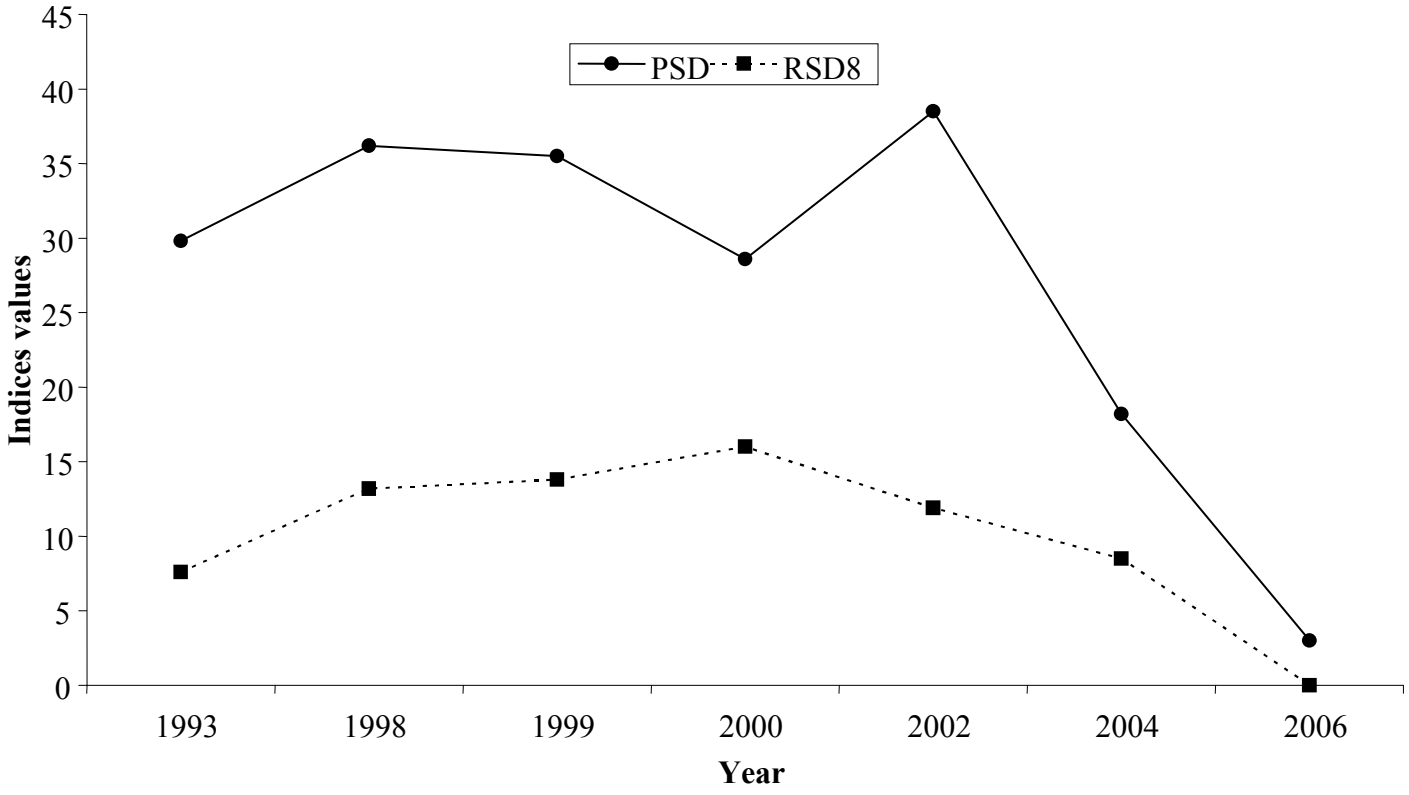

Figure 1. Rock bass PSD and RSD8 indices, 1993 to 2006.

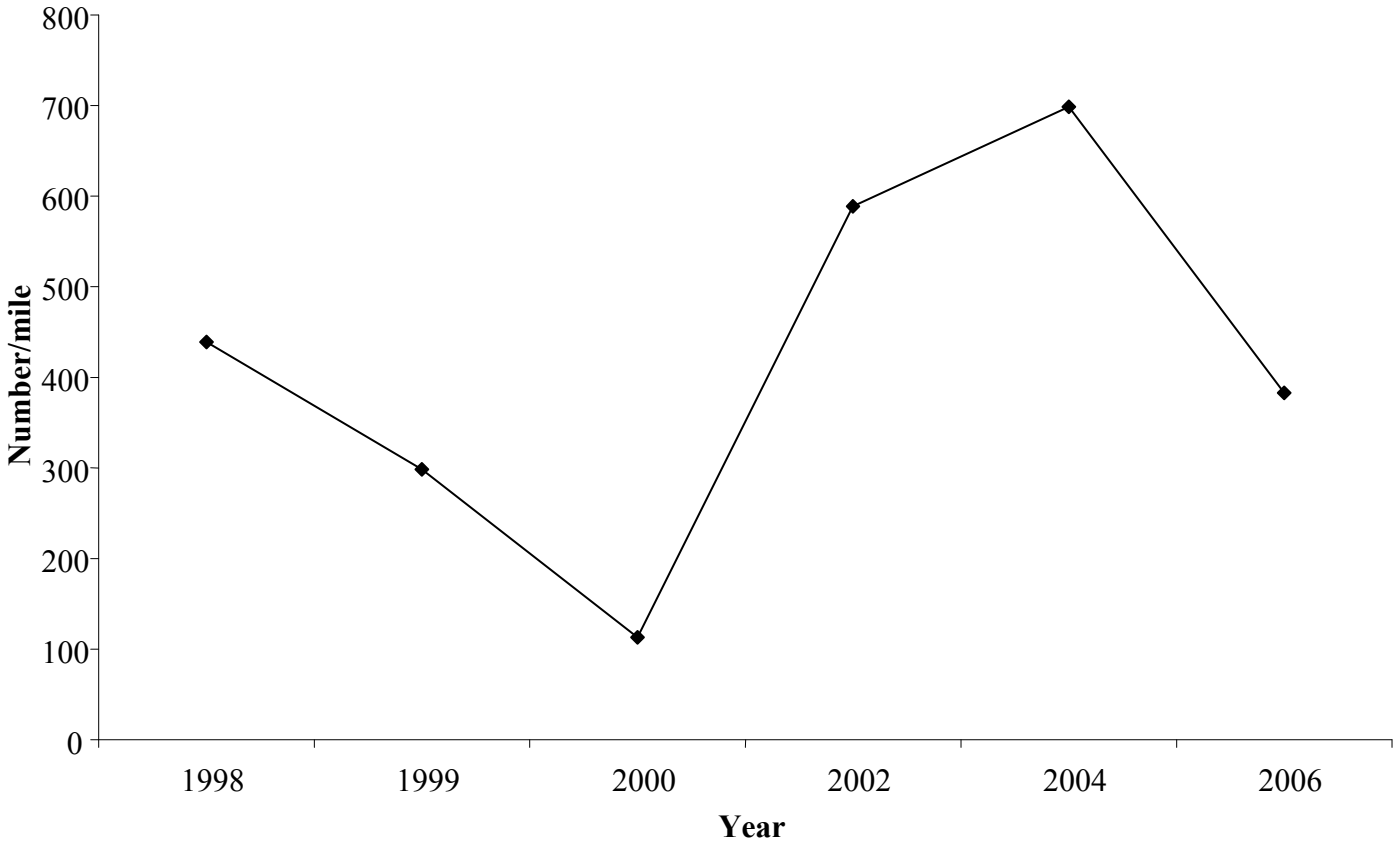

Figure 2. Rock bass mean population estimates, 1998 to 2006.

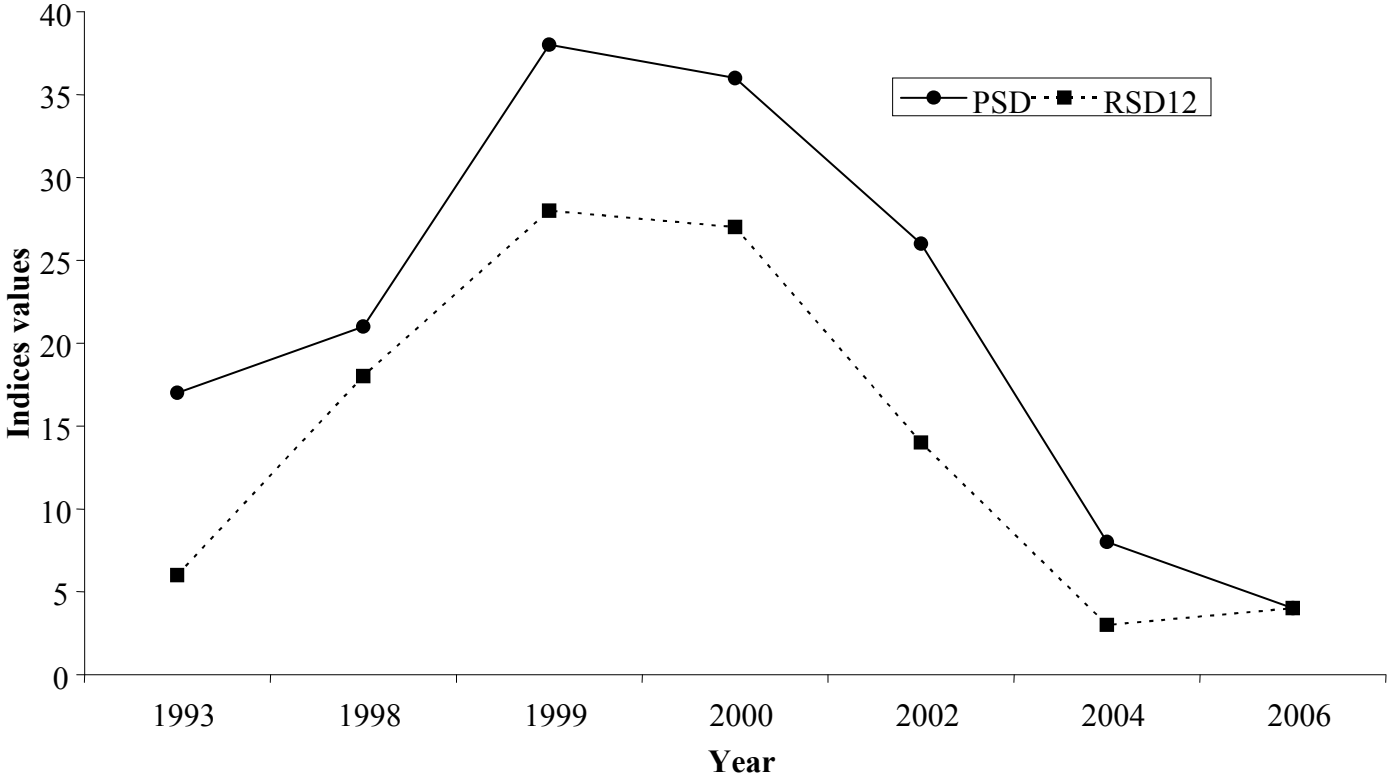

Figure 3. Smallmouth bass PSD and RSD12 indices, 1993 to 2006.

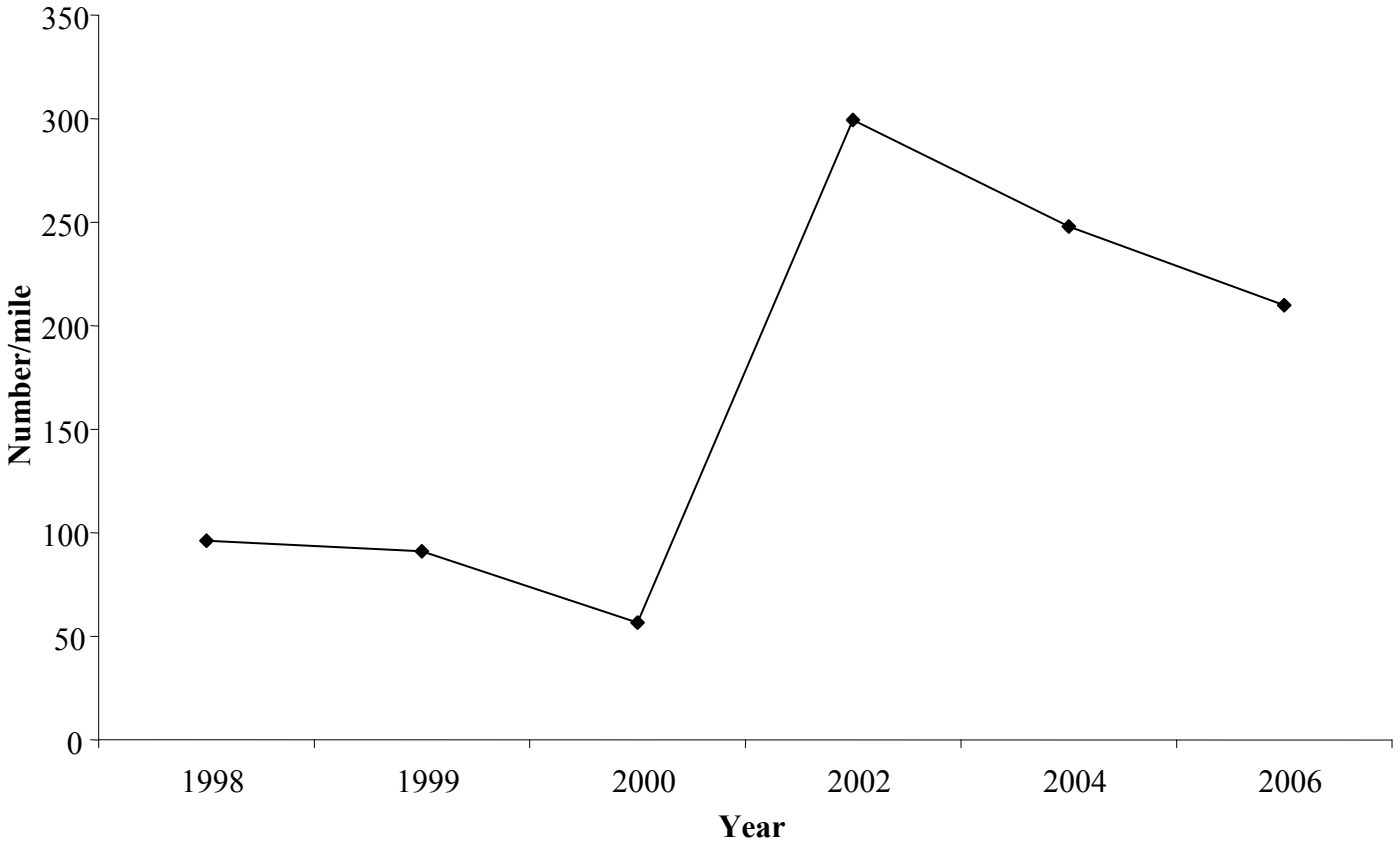

Figure 4. Smallmouth bass mean population estimates, 1998 to 2006.

APPENDIX 1

Game Fish Population Estimate Survey Data

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF ROCK BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0	1	0.9	0.01	not aged	19.0				
1.5	3	2.8	0.01	0	19.5				
2.0					20.0				
2.5	4	3.8	0.03	1, 2	20.5				
3.0	15	14.2	0.02	1	21.0				
3.5	11	10.4	0.03	1	21.5				
4.0	8	7.5	0.05	1	22.0				
4.5	7	6.6	0.08	2	22.5				
5.0	14	13.2	0.10	1, 2	23.0				
5.5	15	14.2	0.13	2, 3	23.5				
6.0	13	12.3	0.17	2, 3	24.0				
6.5	13	12.3	0.20	3	24.5				
7.0					25.0				
7.5	2	1.9	0.30	4	25.5				
8.0					26.0				
8.5					TOTAL	106			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	N/A	GILL NET CATCH	N/A	TRAP NET CATCH	N/A

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF SMALLMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	1	1.4	0.01	not aged	19.5				
2.0					20.0				
2.5					20.5				
3.0	1	1.4	0.30	1	21.0				
3.5					21.5				
4.0	2	2.8	0.05	1	22.0				
4.5	4	5.6	0.05	1	22.5				
5.0	9	12.7	0.06	1, 2	23.0				
5.5	6	8.5	0.08	1, 2	23.5				
6.0	11	15.5	0.08	1, 2	24.0				
6.5	9	12.7	0.14	1, 2	24.5				
7.0	8	11.3	0.16	2	25.0				
7.5	6	8.5	0.20	2, 3	25.5				
8.0	2	2.8	0.28	2	26.0				
8.5	5	7.0	0.28	2, 3	TOTAL	71			
9.0	2	2.8	0.34	3					
9.5	2	2.8	0.41	3					
10.0	1	1.4	0.51	not aged					
10.5	1	1.4	0.55	not aged					
11.0									
11.5									
12.0	1	1.4	0.71	not aged					
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	N/A	GILL NET CATCH	N/A	TRAP NET CATCH	N/A

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF SPOTTED BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	1	4.5	0.01	0	20.5				
3.0					21.0				
3.5	2	9.1	0.01	1	21.5				
4.0	1	4.5	0.04	1	22.0				
4.5					22.5				
5.0					23.0				
5.5	1	4.5	0.06	1	23.5				
6.0	2	9.1	0.13	not aged	24.0				
6.5	8	36.4	0.14	2	24.5				
7.0	3	13.6	0.14	2, 3	25.0				
7.5	2	9.1	0.18	3	25.5				
8.0	2	9.1	0.25	3	26.0				
8.5					TOTAL	22			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	N/A	GILL NET CATCH	N/A	TRAP NET CATCH	N/A

ROCK BASS AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4
1.0	1					
1.5	3	3				
2.0						
2.5	4	3	3	1		
3.0	15	7	15			
3.5	11	6	11			
4.0	8	6	8			
4.5	7	5	1	6		
5.0	14	8		12	2	
5.5	15	8		6	9	
6.0	13	7		2	11	
6.5	13	5			13	
7.0						
7.5	3	3				3
Totals	107	61	38	27	35	3

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	38	3.6	0.25	0.08	3.5	3.8
2	27	5.2	0.50	0.14	4.9	5.5
3	35	6.3	0.21	0.08	6.1	6.4
4	3	7.8	0.00	0.00	7.8	7.8

SMALLMOUTH BASS AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3
1.0					
1.5	1				
2.0					
2.5					
3.0	1	1	1		
3.5					
4.0	2	2	2		
4.5	4	3	4		
5.0	9	9	4	5	
5.5	6	5	1	5	
6.0	11	10	7	4	
6.5	9	7	3	6	
7.0	8	7		8	
7.5	6	6		4	2
8.0	2	2		2	
8.5	5	3		3	2
9.0	2	2			2
9.5	2	1			2
10.0	1				
10.5	1				
11.0					
11.5					
12.0	1				
Totals	71	58	21	38	8

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	21	5.5	0.91	0.21	5.1	5.9
2	38	6.8	1.10	0.17	6.5	7.2
3	8	8.9	0.66	0.29	8.3	9.5

SPOTTED BASS AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3
1.0					
1.5					
2.0					
2.5	1	1			
3.0					
3.5	2	2	2		
4.0	1	1	1		
4.5					
5.0					
5.5	1	1	1		
6.0	2				
6.5	8	9		8	
7.0	3	2		3	
7.5	2	1			2
8.0	2	1			2
Totals	22	18	4	11	4

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	4	4.4	0.90	0.47	3.4	5.3
2	11	6.9	0.05	0.07	6.7	7.0
3	4	8.0	0.08	0.14	7.7	8.3

Appendix 2. Game fish population estimates (number/mile) by sampling station, 1998 to 2006.

Rock bass

	River Mile					
Year	9.0	14.7	34.6	54.5	62.4	Average
1998	123	33	*	695	905	439
1999	62	300	407	379	343	298
2000	31	*	179	79	162	113
2002	223	1,080	564	505	571	589
2004	253	1,140	1,064	310	723	698
2006	192	860	250	N/A	229	383

Smallmouth bass

	River Mile					
Year	9.0	14.7	34.6	54.5	62.4	Average
1998	15	52	321	16	76	96
1999	0	100	179	53	124	91
2000	8	0	164	16	95	57
2002	138	580	564	100	114	299
2004	54	360	493	95	238	248
2006	62	380	286	N/A	114	210

Spotted bass

	River Mile					
Year	9.0	14.7	34.6	54.5	62.4	Average
1998	100	114	57	11	19	60
1999	15	40	71	53		45
2000	*	*	71	*	*	71
2002	*	*	107	*	*	107
2004	*	*	*	*	*	
2006	23	100	100	N/A	114	41

*Denotes not enough fish sampled to calculated a population estimate